

Volume 11

1985

CURRENT ADVANCES IN C A ECOLOGICAL B S SCIENCES

VOL.
11
1985



Pergamon Press Oxford • New York • Toronto • Sydney • Paris • Frankfurt

Current Advances in Ecological Sciences

A PRODUCT OF THE  DATABASE

Chief Editor	H. Smith, Department of Botany, University of Leicester, Leicester, UK	
Associate Editor	P.N. Campbell, Courtauld Institute, London, UK	
Editorial Board	T. Day, Nottingham, UK	J. Sampson, Leicester, UK
	P.G. Jarvis, Edinburgh, UK	A. David Smith, Oxford, UK
	P. Long, Leicester, UK	A.D. Smith, London, UK
	G. McPherson, Oxford, UK	A. Swan, Leicester, UK
Advisory Board	K. Bowler, Durham, UK	P.W. Mullen, Nova Scotia, Canada
	E. Cooper, California, USA	R.T. Rubin, California, USA
	K.J. Dorrington, Ontario, Canada	A.C. Sartorelli, Connecticut, USA
	J. Gielen, Liege, Belgium	J.S. Waid, Victoria, Australia
	G. Kerkut, Southampton, UK	E.J. Wood, Leeds, UK
	W. Lovenberg, Maryland, USA	
<hr/>		
Managing Editor:	Jill Price	
Publishing Manager:	J.M. Brewis	
Senior Assistant Editor:	C.L. Reid	
Assistant Editors:	Biochemistry: K.A. Bignold, Cell & Developmental Biology: A. Moore, Ecological Sciences: J.M. Brewis, Genetics & Molecular Biology: A.J. Jupp, Microbiology: C.L. Reid, Plant Sciences: H.M. Wharam, Pharmacology & Toxicology: C.A. Nicoll, Immunology: P.M. Johnson, Physiology: H.J. Wadsworth	
Production Manager:	J.S. Higson	
Production Staff:	S.J. Wright, K. Lakhani, A.K. Burrows	
Production Office:	CABS, 132 New Walk, Leicester, LE1 7QQ (Tel 0533 548707)	

Current Advances in Ecological Sciences provides a monthly current awareness service for biologists, ecologists and environmental scientists wishing to keep abreast of the literature.

CAES gives listings of titles of ecological papers published throughout the world classified into 55 major areas. Full bibliographic citations and reprint addresses are included. Interdisciplinary areas are covered by extensive cross-referencing, each title appearing in every subject area to which it is relevant. More than 3000 source journals are regularly scanned, yielding around 15,000 titles per year.

SUBSCRIPTION INFORMATION

The following publications from the CURRENT AWARENESS IN BIOLOGICAL SCIENCES (CABS) database are published monthly and are available on subscription as follows:-

Current Advances in Biochemistry	\$275.00
Current Advances in Cell & Developmental Biology	\$275.00
Current Advances in Ecological Sciences	\$320.00
Current Advances in Endocrinology	\$200.00
Current Advances in Genetics & Molecular Biology	\$275.00
Current Advances in Immunology	\$275.00
Current Advances in Microbiology	\$275.00
Current Advances in Neuroscience	\$275.00
Current Advances in Pharmacology & Toxicology	\$350.00
Current Advances in Physiology	\$275.00
Current Advances in Plant Science	\$330.00

COMBINED SUBSCRIPTION TO ALL EDITIONS

Libraries requiring all 11 editions may order a combined subscription at \$1725.00 per annum including postage (saving \$1400.00)

SECOND OR ADDITIONAL SUBSCRIPTION FOR PERSONAL USE

Individuals whose institution takes out a library subscription may purchase a second or additional subscription for personal use at a reduced rate of \$100.00 per annum including postage. Institutions may also order additional subscriptions at this reduced rate.

SUBSCRIPTION ENQUIRIES:

Subscription Manager, Pergamon Press Limited, or Subscription Fulfilment Manager, Pergamon Press Inc.,
 Headington Hill Hall, Oxford, OX3 0BW, England Maxwell House, Fairview Park, Elmsford, NY 10523 USA

CABS ONLINE

From 1985 CABS will be available online. *Current Advances in Ecological Sciences* will be included in this database. For further details contact: Pergamon InfoLine Ltd., 12 Vandy Street, London, EC2A 2DE or Pergamon InfoLine Inc., 1340 Old Chain Bridge Road, McLean, VA 22101, USA.

CABS TEXT

A copy of any article listed in this Journal may be obtained from the address below. The cost for up to a maximum of 25 pages is US\$10 (or US\$12 outside North America). To order, either use the order card in this issue or send your request and remittance listing the accession number given in bold type, and quoting *Current Advances in Ecological Sciences* to: Information on Demand, Box 9550, Berkeley, CA 94709 USA. (In the US call 800-227-0750, from California and the rest of the world call 415-664-4500).

Copyright © 1985 Pergamon Press Ltd.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 1

JANUARY 1985

Nos. 1-1957

CONTENTS

JOURNAL LIST	xvii
1. GENERAL CONCEPTS	1
2. ECOSYSTEM DYNAMICS	1
3. HISTORICAL ECOLOGY	1
4. DISTRIBUTION AND BIOGEOGRAPHY	2
5. SYSTEMATICS	3
6. COMMUNITY ECOLOGY	4
7. POPULATION DYNAMICS	5
8. ANIMAL BEHAVIOUR	8
9. PRODUCTIVITY AND GROWTH RATES	13
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	16
11. PREDATOR-PREY INTERACTIONS	17
12. HOST-PARASITE INTERACTIONS	19
13. PLANT-ANIMAL INTERACTIONS	22
14. COMPETITION AND INTERFERENCE	25
15. INTERACTIONS WITH MICROORGANISMS	27
16. INTERACTIONS WITH SOIL	28
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	28
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	31
19. ENERGY	31
20. BIOGEOCHEMICAL CYCLES	31
21. WATER RELATIONS	32
22. REGENERATION	33
23. REPRODUCTION	33
24. PHENOLOGY AND RHYTHMS	36
25. DISEASE AND INJURY	38
26. ADAPTATION	42
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	44
28. GENE ECOLOGY	47
29. AUTECOLOGY	49
30. MICROMETEOROLOGY	52
31. ARTIFICIAL ENVIRONMENT	52
32. HYDROLOGY	53
33. LITTER AND HUMUS	53
34. ENVIRONMENTAL HAZARDS	53
35. EROSION	53
36. STATISTICS, MODELLING AND SAMPLING	54
37. REMOTE SENSING	56
38. LAND USE AND RECLAMATION	56
39. CONSERVATION	57
40. WILDLIFE MANAGEMENT AND FISH FARMING	57
41. WEED AND PEST CONTROL	59
42. POLLUTION	62
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
43. TROPICAL ECOLOGY	67
44. ARID ZONE ECOLOGY	68
45. FOREST ECOLOGY	68
46. SHRUBLAND ECOLOGY	69
47. GRASSLAND ECOLOGY	69
48. TUNDRA ECOLOGY	70
49. WETLAND ECOLOGY	70
50. FRESHWATER ECOLOGY	70
51. MARINE ECOLOGY	74
52. COASTAL AND ESTUARINE ECOLOGY	77
53. SOIL BIOLOGY	80
54. MICROBIAL ECOLOGY	81
55. CROP ECOLOGY	82
AUTHOR INDEX	84

VOL.
11
1985

ISSN 0306-3291

CAEDX 11 (1) 1-88 (1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 2

FEBRUARY 1985

Nos. 1958-3708

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	89
2. ECOSYSTEM DYNAMICS	89
3. HISTORICAL ECOLOGY	89
4. DISTRIBUTION AND BIOGEOGRAPHY	90
5. SYSTEMATICS	92
6. COMMUNITY ECOLOGY	92
7. POPULATION DYNAMICS	94
8. ANIMAL BEHAVIOUR	97
9. PRODUCTIVITY AND GROWTH RATES	101
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	105
11. PREDATOR-PREY INTERACTIONS	106
12. HOST-PARASITE INTERACTIONS	107
13. PLANT-ANIMAL INTERACTIONS	110
14. COMPETITION AND INTERFERENCE	111
15. INTERACTIONS WITH MICROORGANISMS	112
16. INTERACTIONS WITH SOIL	113
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	114
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	115
19. ENERGY	116
20. BIOGEOCHEMICAL CYCLES	116
21. WATER RELATIONS	117
22. REGENERATION	118
23. REPRODUCTION	118
24. PHENOLOGY AND RHYTHMS	121
25. DISEASE AND INJURY	122
26. ADAPTATION	124
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	125
28. GENECOLOGY	128
29. AUTECOLOGY	129
30. MICROMETEOROLOGY	132
31. ARTIFICIAL ENVIRONMENT	132
32. HYDROLOGY	132
33. LITTER AND HUMUS	133
34. ENVIRONMENTAL HAZARDS	133
35. EROSION	134
36. STATISTICS, MODELLING AND SAMPLING	134
37. REMOTE SENSING	135
38. LAND USE AND RECLAMATION	136
39. CONSERVATION	136
40. WILDLIFE MANAGEMENT AND FISH FARMING	137
41. WEED AND PEST CONTROL	140
42. POLLUTION	142
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
43. TROPICAL ECOLOGY	147
44. ARID ZONE ECOLOGY	147
45. FOREST ECOLOGY	147
46. SHRUBLAND ECOLOGY	148
47. GRASSLAND ECOLOGY	149
48. TUNDRA ECOLOGY	149
49. WETLAND ECOLOGY	149
50. FRESHWATER ECOLOGY	149
51. MARINE ECOLOGY	152
52. COASTAL AND ESTUARINE ECOLOGY	155
53. SOIL BIOLOGY	159
54. MICROBIAL ECOLOGY	160
55. CROP ECOLOGY	161
AUTHOR INDEX	162

ISSN 0306-3291

CAEDX 1 (2) 89-166 (1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 3

MARCH 1985

Nos. 3709-4822

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	167
2. ECOSYSTEM DYNAMICS	167
3. HISTORICAL ECOLOGY	167
4. DISTRIBUTION AND BIOGEOGRAPHY	168
5. SYSTEMATICS	169
6. COMMUNITY ECOLOGY	170
7. POPULATION DYNAMICS	172
8. ANIMAL BEHAVIOUR	174
9. PRODUCTIVITY AND GROWTH RATES	175
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	178
11. PREDATOR-PREY INTERACTIONS	178
12. HOST-PARASITE INTERACTIONS	179
13. PLANT-ANIMAL INTERACTIONS	181
14. COMPETITION AND INTERFERENCE	182
15. INTERACTIONS WITH MICROORGANISMS	183
16. INTERACTIONS WITH SOIL	184
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	184
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	185
19. ENERGY	185
20. BIOGEOCHEMICAL CYCLES	185
21. WATER RELATIONS	186
22. REGENERATION	186
23. REPRODUCTION	187
24. PHENOLOGY AND RHYTHMS	189
25. DISEASE AND INJURY	190
26. ADAPTATION	191
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	192
28. GENECOLOGY	194
29. AUTECOLOGY	196
30. MICROMETEOROLOGY	198
31. ARTIFICIAL ENVIRONMENT	198
32. HYDROLOGY	198
33. LITTER AND HUMUS	199
34. ENVIRONMENTAL HAZARDS	199
35. EROSION	199
36. STATISTICS, MODELLING AND SAMPLING	200
37. REMOTE SENSING	201
38. LAND USE AND RECLAMATION	201
39. CONSERVATION	201
40. WILDLIFE MANAGEMENT	202
41. FISH FARMING AND AQUACULTURE	202
42. WEED AND PEST CONTROL	203
43. POLLUTION	203
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	205
45. ARID ZONE ECOLOGY	205
46. FOREST ECOLOGY	206
47. SHRUBLAND ECOLOGY	207
48. GRASSLAND ECOLOGY	207
49. TUNDRA ECOLOGY	208
50. WETLAND ECOLOGY	208
51. FRESHWATER ECOLOGY	208
52. MARINE ECOLOGY	211
53. COASTAL AND ESTUARINE ECOLOGY	213
54. SOIL BIOLOGY	214
55. MICROBIAL ECOLOGY	214
56. CROP ECOLOGY	215
AUTHOR INDEX	216

VOL.
11
1985

ISSN 0306-3291

CAEDX 11 (3) 167-218(1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 4

APRIL 1985

Nos. 4823-6590

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	219
2. ECOSYSTEM DYNAMICS	219
3. HISTORICAL ECOLOGY	220
4. DISTRIBUTION AND BIOGEOGRAPHY	221
5. SYSTEMATICS	222
6. COMMUNITY ECOLOGY	223
7. POPULATION DYNAMICS	225
8. ANIMAL BEHAVIOUR	228
9. PRODUCTIVITY AND GROWTH RATES	232
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	235
11. PREDATOR-PREY INTERACTIONS	236
12. HOST-PARASITE INTERACTIONS	237
13. PLANT-ANIMAL INTERACTIONS	239
14. COMPETITION AND INTERFERENCE	241
15. INTERACTIONS WITH MICROORGANISMS	242
16. INTERACTIONS WITH SOIL	243
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	243
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	245
19. ENERGY	246
20. BIOGEOCHEMICAL CYCLES	246
21. WATER RELATIONS	247
22. REGENERATION	248
23. REPRODUCTION	248
24. PHENOLOGY AND RHYTHMS	251
25. DISEASE AND INJURY	252
26. ADAPTATION	254
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	255
28. GENECOLOGY	259
29. AUTECOLOGY	260
30. MICROMETEOROLOGY	263
31. ARTIFICIAL ENVIRONMENT	263
32. HYDROLOGY	263
33. LITTER AND HUMUS	264
34. ENVIRONMENTAL HAZARDS	264
35. EROSION	265
36. STATISTICS, MODELLING AND SAMPLING	265
37. REMOTE SENSING	267
38. LAND USE AND RECLAMATION	268
39. CONSERVATION	268
40. WILDLIFE MANAGEMENT	269
41. FISH FARMING AND AQUACULTURE	269
42. WEED AND PEST CONTROL	270
43. POLLUTION	272
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	277
45. ARID ZONE ECOLOGY	278
46. FOREST ECOLOGY	278
47. SHRUBLAND ECOLOGY	279
48. GRASSLAND ECOLOGY	280
49. TUNDRA ECOLOGY	280
50. WETLAND ECOLOGY	280
51. FRESHWATER ECOLOGY	281
52. MARINE ECOLOGY	285
53. COASTAL AND ESTUARINE ECOLOGY	288
54. SOIL BIOLOGY	290
55. MICROBIAL ECOLOGY	291
56. CROP ECOLOGY	293
58. SYMPOSIA	293
AUTHOR INDEX	295

ISSN 0306-3291

CAEDX 11 (4) 219-300 (1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 5

MAY 1985

Nos. 6591-8761

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	301
2. ECOSYSTEM DYNAMICS	301
3. HISTORICAL ECOLOGY	302
4. DISTRIBUTION AND BIOGEOGRAPHY	303
5. SYSTEMATICS	304
6. COMMUNITY ECOLOGY	305
7. POPULATION DYNAMICS	307
8. ANIMAL BEHAVIOUR	311
9. PRODUCTIVITY AND GROWTH RATES	316
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	319
11. PREDATOR-PREY INTERACTIONS	320
12. HOST-PARASITE INTERACTIONS	322
13. PLANT-ANIMAL INTERACTIONS	325
14. COMPETITION AND INTERFERENCE	329
15. INTERACTIONS WITH MICROORGANISMS	330
16. INTERACTIONS WITH SOIL	332
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	333
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	335
19. ENERGY	336
20. BIOGEOCHEMICAL CYCLES	336
21. WATER RELATIONS	337
22. REGENERATION	338
23. REPRODUCTION	338
24. PHENOLOGY AND RHYTHMS	342
25. DISEASE AND INJURY	345
26. ADAPTATION	348
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	349
28. GENECOLOGY	351
29. AUTECOLOGY	353
30. MICROMETEOROLOGY	358
31. ARTIFICIAL ENVIRONMENT	358
32. HYDROLOGY	359
33. LITTER AND HUMUS	359
34. ENVIRONMENTAL HAZARDS	360
35. EROSION	360
36. STATISTICS, MODELLING AND SAMPLING	360
37. REMOTE SENSING	363
38. LAND USE AND RECLAMATION	363
39. CONSERVATION	364
40. WILDLIFE MANAGEMENT	365
41. FISH FARMING AND AQUACULTURE	366
42. WEED AND PEST CONTROL	367
43. POLLUTION	371
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	377
45. ARID ZONE ECOLOGY	378
46. FOREST ECOLOGY	378
47. SHRUBLAND ECOLOGY	380
48. GRASSLAND ECOLOGY	380
49. TUNDRA ECOLOGY	380
50. WETLAND ECOLOGY	380
51. FRESHWATER ECOLOGY	381
52. MARINE ECOLOGY	385
53. COASTAL AND ESTUARINE ECOLOGY	388
54. SOIL BIOLOGY	391
55. MICROBIAL ECOLOGY	391
56. CROP ECOLOGY	392
58. SYMPOSIA	393
AUTHOR INDEX	394

VOL.
11
1985

ISSN 0306-3291

CAEDX 11 (5) 301-400(1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 6

JUNE 1985

Nos. 8762-10232

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	401
2. ECOSYSTEM DYNAMICS	401
3. HISTORICAL ECOLOGY	401
4. DISTRIBUTION AND BIOGEOGRAPHY	402
5. SYSTEMATICS	403
6. COMMUNITY ECOLOGY	403
7. POPULATION DYNAMICS	406
8. ANIMAL BEHAVIOUR	408
9. PRODUCTIVITY AND GROWTH RATES	411
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	415
11. PREDATOR-PREY INTERACTIONS	415
12. HOST-PARASITE INTERACTIONS	417
13. PLANT-ANIMAL INTERACTIONS	419
14. COMPETITION AND INTERFERENCE	421
15. INTERACTIONS WITH MICROORGANISMS	422
16. INTERACTIONS WITH SOIL	424
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	424
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	426
19. ENERGY	427
20. BIOGEOCHEMICAL CYCLES	427
21. WATER RELATIONS	428
22. REGENERATION	429
23. REPRODUCTION	429
24. PHENOLOGY AND RHYTHMS	431
25. DISEASE AND INJURY	433
26. ADAPTATION	434
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
27. NUTRITION	435
28. GENECOLOGY	436
29. AUTECOLOGY	438
30. MICROMETEOROLOGY	440
31. ARTIFICIAL ENVIRONMENT	440
32. HYDROLOGY	440
33. LITTER AND HUMUS	441
34. ENVIRONMENTAL HAZARDS	441
35. EROSION	442
36. STATISTICS, MODELLING AND SAMPLING	442
37. REMOTE SENSING	444
38. LAND USE AND RECLAMATION	444
39. CONSERVATION	445
40. WILDLIFE MANAGEMENT	446
41. FISH FARMING AND AQUACULTURE	446
42. WEED AND PEST CONTROL	447
43. POLLUTION	448
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	452
45. ARID ZONE ECOLOGY	452
46. FOREST ECOLOGY	453
47. SHRUBLAND ECOLOGY	454
48. GRASSLAND ECOLOGY	455
49. TUNDRA ECOLOGY	455
50. WETLAND ECOLOGY	455
51. FRESHWATER ECOLOGY	455
52. MARINE ECOLOGY	459
53. COASTAL AND ESTUARINE ECOLOGY	460
54. SOIL BIOLOGY	463
55. MICROBIAL ECOLOGY	463
56. CROP ECOLOGY	464
58. SYMPOSIA	464
AUTHOR INDEX	466

ISSN 0306-3291

CAEDX 11 (6) 401-470(1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 7

JULY 1985

Nos. 10233-11885

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	471
2. ECOSYSTEM DYNAMICS	471
3. HISTORICAL ECOLOGY	471
4. DISTRIBUTION AND BIOGEOGRAPHY	473
5. SYSTEMATICS	474
6. COMMUNITY ECOLOGY	474
7. POPULATION DYNAMICS	477
8. ANIMAL BEHAVIOUR	479
9. PRODUCTIVITY AND GROWTH RATES	484
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	487
11. PREDATOR-PREY INTERACTIONS	488
12. HOST-PARASITE INTERACTIONS	489
13. PLANT-ANIMAL INTERACTIONS	492
14. COMPETITION AND INTERFERENCE	494
15. INTERACTIONS WITH MICROORGANISMS	495
16. INTERACTIONS WITH SOIL	497
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	497
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	499
20. BIOGEOCHEMICAL CYCLES	499
21. WATER RELATIONS	500
22. REGENERATION	501
23. REPRODUCTION	502
24. PHENOLOGY AND RHYTHMS	504
25. DISEASE AND INJURY	506
26. ADAPTATION	508
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	510
28. GENECOLOGY	512
29. AUTECOLOGY	514
30. MICROMETEOROLOGY	515
31. ARTIFICIAL ENVIRONMENT	516
32. HYDROLOGY	516
33. LITTER AND HUMUS	516
34. ENVIRONMENTAL HAZARDS	517
35. EROSION	517
36. STATISTICS, MODELLING AND SAMPLING	517
37. REMOTE SENSING	519
38. LAND USE AND RECLAMATION	520
39. CONSERVATION	521
40. WILDLIFE MANAGEMENT	521
41. FISH FARMING AND AQUACULTURE	522
42. WEED AND PEST CONTROL	523
43. POLLUTION	524
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	528
45. ARID ZONE ECOLOGY	528
46. FOREST ECOLOGY	529
47. SHRUBLAND ECOLOGY	530
48. GRASSLAND ECOLOGY	530
49. TUNDRA ECOLOGY	531
50. WETLAND ECOLOGY	531
51. FRESHWATER ECOLOGY	532
52. MARINE ECOLOGY	534
53. COASTAL AND ESTUARINE ECOLOGY	536
54. SOIL BIOLOGY	538
55. MICROBIAL ECOLOGY	539
56. CROP ECOLOGY	540
58. SYMPOSIA	541
AUTHOR INDEX	542

VOL.
11
1985

ISSN 0306-3291

CAEDX 11 (7) 471-546(1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 8

AUGUST 1985

Nos. 11886-13731

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	547
2. ECOSYSTEM DYNAMICS	547
3. HISTORICAL ECOLOGY	547
4. DISTRIBUTION AND BIOGEOGRAPHY	548
5. SYSTEMATICS	550
6. COMMUNITY ECOLOGY	550
7. POPULATION DYNAMICS	556
8. ANIMAL BEHAVIOUR	561
9. PRODUCTIVITY AND GROWTH RATES	565
(a) Plant	
(b) Animal	
(c) Microbiological	
(d) Systems	
10. PRIMARY PRODUCTION PROCESSES	568
11. PREDATOR-PREY INTERACTIONS	570
12. HOST-PARASITE INTERACTIONS	572
13. PLANT-ANIMAL INTERACTIONS	575
14. COMPETITION AND INTERFERENCE	576
15. INTERACTIONS WITH MICROORGANISMS	577
16. INTERACTIONS WITH SOIL	578
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	580
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	581
19. ENERGY	581
20. BIOGEOCHEMICAL CYCLES	582
21. WATER RELATIONS	583
22. REGENERATION	583
23. REPRODUCTION	586
24. PHENOLOGY AND RHYTHMS	588
25. DISEASE AND INJURY	589
26. ADAPTATION	
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	593
28. GENECOLOGY	596
29. AUTECOLOGY	598
30. MICROMETEOROLOGY	599
31. ARTIFICIAL ENVIRONMENT	600
32. HYDROLOGY	600
33. LITTER AND HUMUS	600
34. ENVIRONMENTAL HAZARDS	601
35. EROSION	601
36. STATISTICS, MODELLING AND SAMPLING	601
37. REMOTE SENSING	604
38. LAND USE AND RECLAMATION	605
39. CONSERVATION	606
40. WILDLIFE MANAGEMENT	607
41. FISH FARMING AND AQUACULTURE	609
42. WEED AND PEST CONTROL	611
43. POLLUTION	612
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	616
45. ARID ZONE ECOLOGY	617
46. FOREST ECOLOGY	617
47. SHRUBLAND ECOLOGY	619
48. GRASSLAND ECOLOGY	619
49. TUNDRA ECOLOGY	620
50. WETLAND ECOLOGY	620
51. FRESHWATER ECOLOGY	621
52. MARINE ECOLOGY	623
53. COASTAL AND ESTUARINE ECOLOGY	626
54. SOIL BIOLOGY	627
55. MICROBIAL ECOLOGY	628
56. CROP ECOLOGY	629
57. BIOTECHNOLOGY	630
58. SYMPOSIA	630
AUTHOR INDEX	631

ISSN 0306-3291
CAEDX 11 (8) 547-636(1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 9

SEPTEMBER 1985

Nos. 13732-15115

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	637
2. ECOSYSTEM DYNAMICS	637
3. HISTORICAL ECOLOGY	637
4. DISTRIBUTION AND BIOGEOGRAPHY	638
5. SYSTEMATICS	639
6. COMMUNITY ECOLOGY	640
7. POPULATION DYNAMICS	644
8. ANIMAL BEHAVIOUR	649
9. PRODUCTIVITY AND GROWTH RATES	652
(a) Plant	
(b) Animal	
(c) Microbiological	
10. PRIMARY PRODUCTION PROCESSES	655
11. PREDATOR-PREY INTERACTIONS	655
12. HOST-PARASITE INTERACTIONS	656
13. PLANT-ANIMAL INTERACTIONS	659
14. COMPETITION AND INTERFERENCE	661
15. INTERACTIONS WITH MICROORGANISMS	663
16. INTERACTIONS WITH SOIL	665
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	665
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	667
19. ENERGY	667
20. BIOGEOCHEMICAL CYCLES	667
21. WATER RELATIONS	668
22. REGENERATION	669
23. REPRODUCTION	669
24. PHENOLOGY AND RHYTHMS	671
25. DISEASE AND INJURY	672
26. ADAPTATION	673
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	675
28. GENE ECOLOGY	677
29. AUTECOLOGY	679
30. MICROMETEOROLOGY	680
31. ARTIFICIAL ENVIRONMENT	680
32. HYDROLOGY	681
33. LITTER AND HUMUS	681
34. ENVIRONMENTAL HAZARDS	681
35. EROSION	682
36. STATISTICS, MODELLING AND SAMPLING	682
37. REMOTE SENSING	683
38. LAND USE AND RECLAMATION	684
39. CONSERVATION	684
40. WILDLIFE MANAGEMENT	685
41. FISH FARMING AND AQUACULTURE	686
42. WEED AND PEST CONTROL	688
43. POLLUTION	689
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	691
45. ARID ZONE ECOLOGY	691
46. FOREST ECOLOGY	692
47. SHRUBLAND ECOLOGY	693
48. GRASSLAND ECOLOGY	693
49. TUNDRA ECOLOGY	694
50. WETLAND ECOLOGY	694
51. FRESHWATER ECOLOGY	694
52. MARINE ECOLOGY	696
53. COASTAL AND ESTUARINE ECOLOGY	697
54. SOIL BIOLOGY	698
55. MICROBIAL ECOLOGY	698
56. CROP ECOLOGY	699
58. SYMPOSIA	700
AUTHOR INDEX	701

VOL.
11
1985

ISSN (9) 0306-3291
CAEDX 11 (9) 637-704 (1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 10

OCTOBER 1985

Nos. 15116-16764

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	705
2. ECOSYSTEM DYNAMICS	705
3. HISTORICAL ECOLOGY	705
4. DISTRIBUTION AND BIOGEOGRAPHY	706
5. SYSTEMATICS	708
6. COMMUNITY ECOLOGY	709
7. POPULATION DYNAMICS	712
8. ANIMAL BEHAVIOUR	717
9. PRODUCTIVITY AND GROWTH RATES	720
(a) Plant	
(b) Animal	
(c) Microbiological	
10. PRIMARY PRODUCTION PROCESSES	722
11. PREDATOR-PREY INTERACTIONS	723
12. HOST-PARASITE INTERACTIONS	724
13. PLANT-ANIMAL INTERACTIONS	727
14. COMPETITION AND INTERFERENCE	729
15. INTERACTIONS WITH MICROORGANISMS	730
16. INTERACTIONS WITH SOIL	732
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	732
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	734
20. BIOGEOCHEMICAL CYCLES	735
21. WATER RELATIONS	737
22. REGENERATION	737
23. REPRODUCTION	738
24. PHENOLOGY AND RHYTHMS	740
25. DISEASE AND INJURY	741
26. ADAPTATION	742
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	745
28. GENECOLOGY	747
29. AUTECOLOGY	749
30. MICROMETEOROLOGY	750
31. ARTIFICIAL ENVIRONMENT	750
32. HYDROLOGY	751
33. LITTER AND HUMUS	751
34. ENVIRONMENTAL HAZARDS	751
35. EROSION	752
36. STATISTICS, MODELLING AND SAMPLING	752
37. REMOTE SENSING	754
38. LAND USE AND RECLAMATION	754
39. CONSERVATION	755
40. WILDLIFE MANAGEMENT	755
41. FISH FARMING AND AQUACULTURE	756
42. WEED AND PEST CONTROL	757
43. POLLUTION	759
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	762
45. ARID ZONE ECOLOGY	763
46. FOREST ECOLOGY	763
47. SHRUBLAND ECOLOGY	765
48. GRASSLAND ECOLOGY	765
49. TUNDRA ECOLOGY	765
50. WETLAND ECOLOGY	766
51. FRESHWATER ECOLOGY	766
52. MARINE ECOLOGY	768
53. COASTAL AND ESTUARINE ECOLOGY	770
54. SOIL BIOLOGY	772
55. MICROBIAL ECOLOGY	773
56. CROP ECOLOGY	774
58. SYMPOSIA	775
AUTHOR INDEX	776

ISSN 0306-3291

CAEDX 11 (10) 705-780 (1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 11

NOVEMBER 1985

Nos. 16765-18442

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	781
2. ECOSYSTEM DYNAMICS	781
3. HISTORICAL ECOLOGY	781
4. DISTRIBUTION AND BIOGEOGRAPHY	782
5. SYSTEMATICS	786
6. COMMUNITY ECOLOGY	786
7. POPULATION DYNAMICS	790
8. ANIMAL BEHAVIOUR	794
9. PRODUCTIVITY AND GROWTH RATES	802
(a) Plant	
(b) Animal	
(c) Microbiological	
10. PRIMARY PRODUCTION PROCESSES	804
11. PREDATOR-PREY INTERACTIONS	804
12. HOST-PARASITE INTERACTIONS	806
13. PLANT-ANIMAL INTERACTIONS	808
14. COMPETITION AND INTERFERENCE	810
15. INTERACTIONS WITH MICROORGANISMS	811
16. INTERACTIONS WITH SOIL	812
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	812
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	814
19. ENERGY	815
20. BIOGEOCHEMICAL CYCLES	815
21. WATER RELATIONS	817
22. REGENERATION	817
23. REPRODUCTION	817
24. PHENOLOGY AND RHYTHMS	821
25. DISEASE AND INJURY	822
26. ADAPTATION	823
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	825
28. GENECOLOGY	828
29. AUTECOLOGY	829
30. MICROMETEOROLOGY	832
31. ARTIFICIAL ENVIRONMENT	832
32. HYDROLOGY	832
33. LITTER AND HUMUS	832
34. ENVIRONMENTAL HAZARDS	833
35. EROSION	834
36. STATISTICS, MODELLING AND SAMPLING	834
37. REMOTE SENSING	836
38. LAND USE AND RECLAMATION	837
39. CONSERVATION	837
40. WILDLIFE MANAGEMENT	838
41. FISH FARMING AND AQUACULTURE	838
42. WEED AND PEST CONTROL	839
43. POLLUTION	841
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	845
45. ARID ZONE ECOLOGY	845
46. FOREST ECOLOGY	845
47. SHRUBLAND ECOLOGY	846
48. GRASSLAND ECOLOGY	846
49. TUNDRA ECOLOGY	847
50. WETLAND ECOLOGY	847
51. FRESHWATER ECOLOGY	847
52. MARINE ECOLOGY	850
53. COASTAL AND ESTUARINE ECOLOGY	851
54. SOIL BIOLOGY	852
55. MICROBIAL ECOLOGY	853
56. CROP ECOLOGY	855
58. SYMPOSIA	855
AUTHOR INDEX	857

VOL.
11
1985

ISSN 0306-3291

CAEDX 11 (11) 781-862 (1985)

CURRENT ADVANCES IN ECOLOGICAL SCIENCES

VOL. 11, NO. 12

DECEMBER 1985

Nos. 18443-20331

CONTENTS

JOURNAL LIST	iii
1. GENERAL CONCEPTS	863
2. ECOSYSTEM DYNAMICS	863
3. HISTORICAL ECOLOGY	863
4. DISTRIBUTION AND BIOGEOGRAPHY	864
5. SYSTEMATICS	868
6. COMMUNITY ECOLOGY	868
7. POPULATION DYNAMICS	870
8. ANIMAL BEHAVIOUR	874
9. PRODUCTIVITY AND GROWTH RATES	882
(a) Plant	
(b) Animal	
(c) Microbiological	
10. PRIMARY PRODUCTION PROCESSES	883
11. PREDATOR-PREY INTERACTIONS	884
12. HOST-PARASITE INTERACTIONS	886
13. PLANT-ANIMAL INTERACTIONS	889
14. COMPETITION AND INTERFERENCE	891
15. INTERACTIONS WITH MICROORGANISMS	892
16. INTERACTIONS WITH SOIL	894
17. INTERACTIONS WITH THE PHYSICAL ENVIRONMENT	894
(a) Temperature effects	
(b) Other environmental effects	
18. INTERACTIONS WITH MAN	897
19. ENERGY	897
20. BIOGEOCHEMICAL CYCLES	898
21. WATER RELATIONS	899
22. REGENERATION	900
23. REPRODUCTION	900
24. PHENOLOGY AND RHYTHMS	903
25. DISEASE AND INJURY	904
26. ADAPTATION	906
(a) Physiological and biochemical adaptations	
(b) Morphological adaptations	
(c) Behavioural adaptations	
27. NUTRITION	908
28. GENECOLOGY	911
29. AUTECOLOGY	913
30. MICROMETEOROLOGY	915
31. ARTIFICIAL ENVIRONMENT	915
32. HYDROLOGY	915
33. LITTER AND HUMUS	916
34. ENVIRONMENTAL HAZARDS	916
35. EROSION	916
36. STATISTICS, MODELLING AND SAMPLING	917
37. REMOTE SENSING	920
38. LAND USE AND RECLAMATION	921
39. CONSERVATION	921
40. WILDLIFE MANAGEMENT	922
41. FISH FARMING AND AQUACULTURE	923
42. WEED AND PEST CONTROL	924
43. POLLUTION	926
(a) Distribution of pollutants	
(b) Effects of pollutants	
(c) Residues of pollutants	
(d) Biodegradation of pollutants	
44. TROPICAL ECOLOGY	929
45. ARID ZONE ECOLOGY	930
46. FOREST ECOLOGY	930
48. GRASSLAND ECOLOGY	931
49. TUNDRA ECOLOGY	931
50. WETLAND ECOLOGY	932
51. FRESHWATER ECOLOGY	932
52. MARINE ECOLOGY	933
53. COASTAL AND ESTUARINE ECOLOGY	935
54. SOIL BIOLOGY	937
55. MICROBIAL ECOLOGY	938
56. CROP ECOLOGY	939
58. SYMPOSIA	940
AUTHOR INDEX	941

ISSN 0306-3291

CAEDX 11 (12) 863-946 (1985)

VOL.
11
1985